In the Claims:

1 - 66. (cancelled)

67. (currently amended) A material discrimination system including a high energy X-ray source, a first detector component in the form of a thin scintillation crystal for registering an amount of energy deposited by an X-ray that is essentially independent of the X-ray energy, ~~a low-Z converter located after this crystal to stop electrons produced by X-ray interactions downstream of the thin crystal from being significantly back scattered into the thin crystal and prevent electrons leaving the thin crystal from returning and depositing more energy in the thin crystal, and~~ a thicker one-piece downstream scintillation crystal, ~~wherein the~~a low-Z converter ~~is~~ situated between the thin crystal and the thicker crystal to stop electrons produced by X-ray interactions downstream of the thin crystal from being significantly backscattered into the thin crystal and prevent electrons leaving the thin crystal from returning and depositing more energy in the thin crystal, and a plurality of read-out devices for detecting light energy emitted by the crystals and generating respective electrical output signals in response thereto, wherein a pair of read-out devices is provided to read out from opposite sides of the thin crystal, and further pairs of read-out devices are provided to read out from opposite sides of the thicker crystal at different respective depths in the beam direction, and wherein the output signal from one read-out device of each pair is added to the output signal from the other read-out device of the pair on the opposite side of the crystal to reduce any left/right asymmetry in the output signals.

68. (previously presented) A material discrimination system as claimed in claim 67, wherein the low-Z converter is formed of aluminium.

69-72. (cancelled)

73. (previously presented) A material discrimination system as claimed in claim 67, wherein behind the low-Z converter is located a high-Z, high density converter.

74-75. (cancelled)

76. (previously presented) A material discrimination system as claimed in claim 73, where the high-Z converter is formed of tungsten.

77-78. (cancelled)

79. (currently amended) A material discrimination system as claimed in claim 67, wherein each ~~crystal is read out by~~ pair of read-out devices comprises a pair of photodiodes or a pair of optical fibres.

80. (cancelled)

81. (currently amended) A material discrimination system as claimed in claim 67, wherein an absorber is located at the rear of a detector assembly.

82. (previously presented) A material discrimination system as claimed in claim 81, wherein the absorber is formed of aluminium.

83. (currently amended) A material discrimination detector for X-ray inspection using high energy X-rays including a thin front crystal having two opposite side faces, wherein the crystal is read out from each side face by a photodiode, or optical fibre, and the output signals from ~~the two opposite~~ one side faces of the crystal ~~are~~ is added to the output signal from the other side face, so as to ~~prevent~~ reduce any left/right asymmetry in ~~an~~ the output signals.

84-92. (cancelled)

93. (currently amended) A method of manufacturing a material discrimination detector for use in an X-ray discrimination system for X-ray inspection using high energy X-rays including separate front and rear scintillation crystals and a low-Z converter between the front and rear crystals, wherein the method includes a step of cutting the front and rear crystals ~~are cut~~ from the same ingot of material.

~~94-95.~~ (cancelled)

96. (previously presented) A detector as claimed in claim 93, wherein the crystal material is CsI.

97. (currently amended) A material discrimination system for X-ray inspection using high energy X-rays which includes a Linac for generating high energy X-rays, a detector, and a detector read-out system, means for synchronising the read-out system with each Linac pulse, with one read-out cycle for each pulse, and means for selectively

triggering the Linac on a Linac pulse, wherein the Linac is triggered on each alternate pulse only, wherein one read-out cycle is performed for each pulse, and signals generated during read-out cycles for pulses on which the Linac is not triggered correspond to background noise and crystal persistence and are subtracted from signals generated during read-out cycles for pulses on which the Linac is triggered.

98-111. (cancelled)